LiDAR
Light Detection And Ranging

WeGo Korea

ROS

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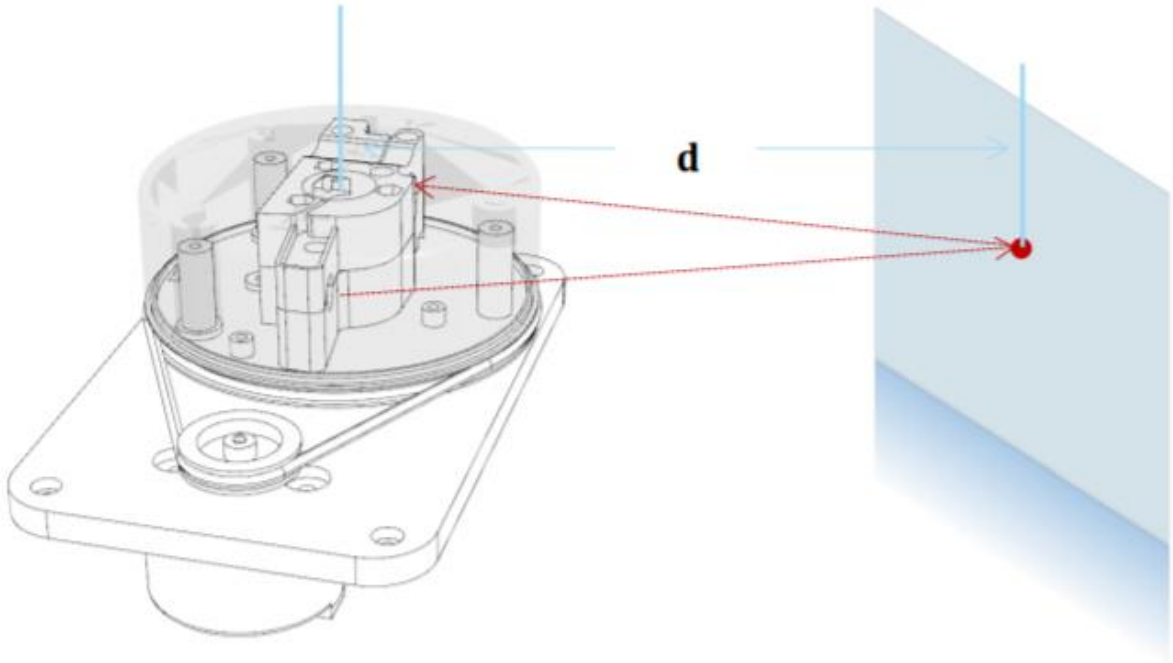
목차

01

LiDAR Introduction

RPLiDAR Laser Scan

- 시계 방향으로 회전 및 스캔
- Contains a range scanner system and motor system



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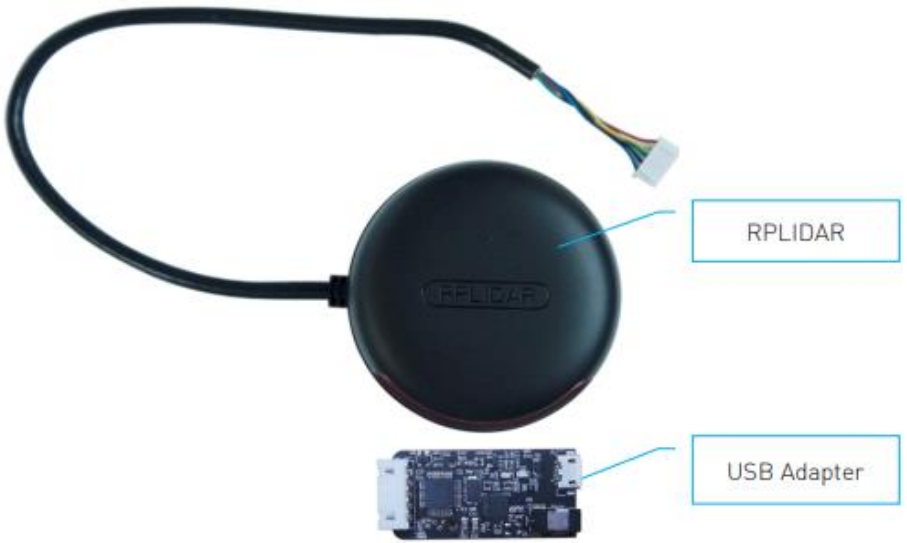
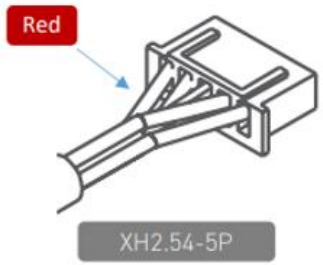
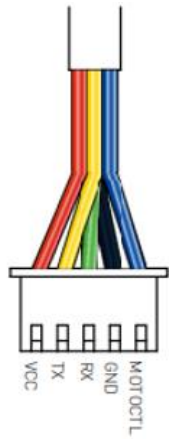
RPLiDAR Laser Scan

RPLIDAR A1

- 360도 2D 레이저 스캐너 (LiDAR: MAX.12M)
- 2D 포인트 클라우드 데이터 (Mapping, Localization and object)







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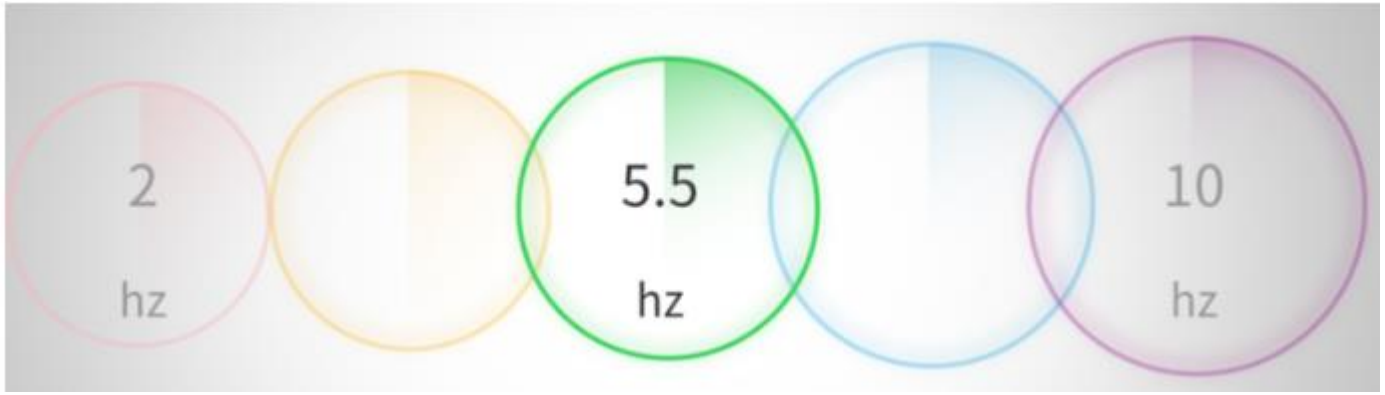
RPLiDAR Laser Scan

RPLIDAR A1

- ROS Package & C++
- PWM Control (2~10Hz)



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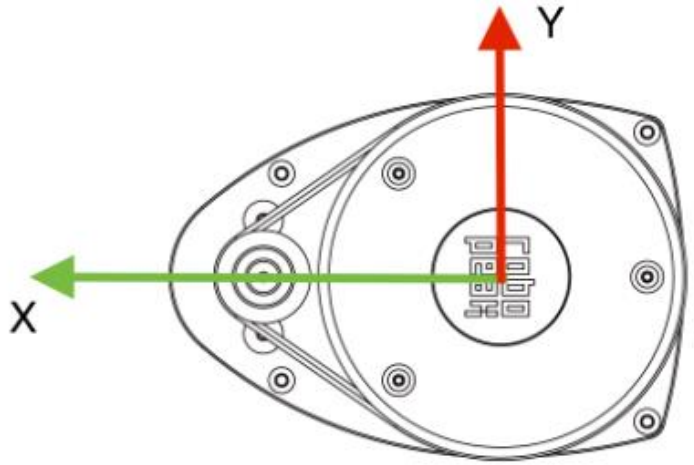
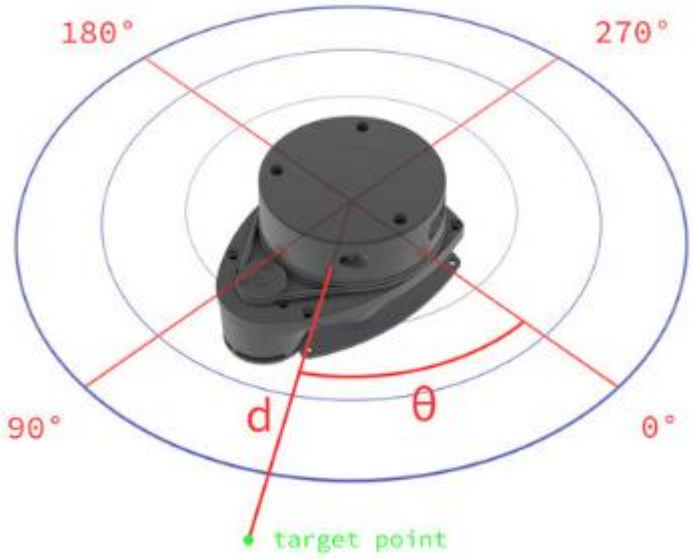
RPLiDAR Laser Scan

RPLIDAR A1

- Direction and angle Setting



Z-axis is directed to RPLidar's bottom side



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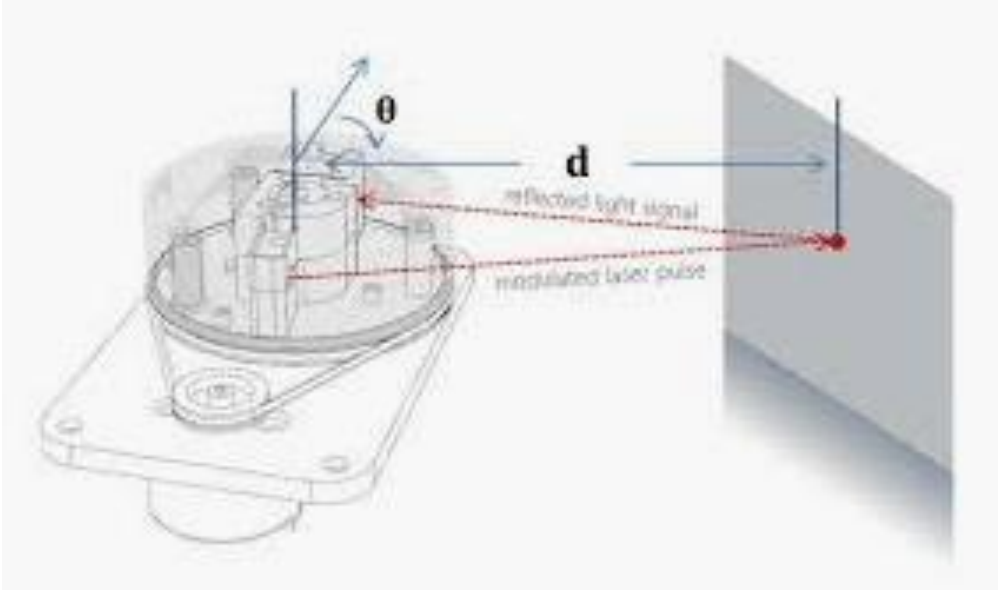
네비게이션_벽, 물체 장애물 계측

1. 거리센서, 비전 센서등 다양한 종류의 센서 사용
2. 거리 센서에는 레이저 기반의 거리센서

장애물을 파악하는데 사용



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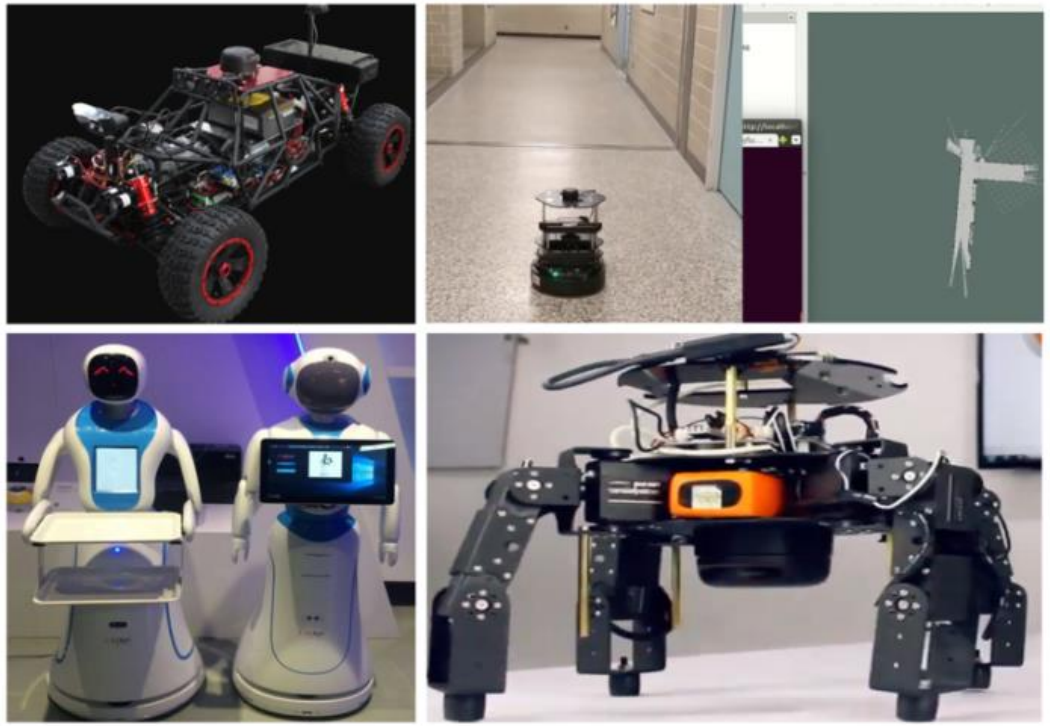
RPLiDAR Laser Scan

RPLIDAR

- 레이저 스캐너를 통해 실내측정
- 실내 로봇 및 연구분야에 사용



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RPLiDAR Laser Scan

RPLIDAR A2

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RPLiDAR Laser Scan

RPLiDAR A1

-12M, 2K/4K

RPLIDAR A2

-16M, 4K/8K

RPLiDAR A3

-25M, 16K

ROS 샘플이 많을 수록 맵핑 속도가 빠르고 정밀.

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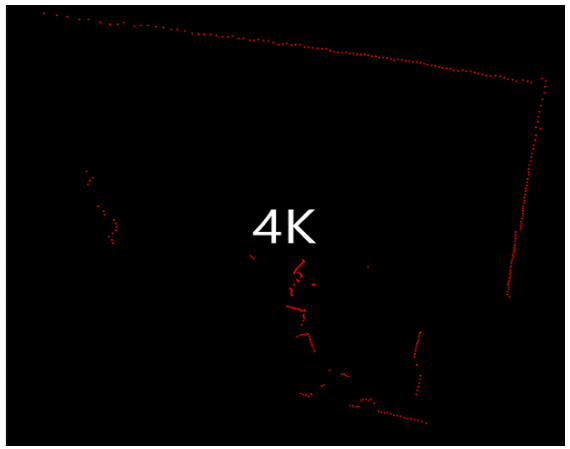
RPLiDAR Laser Scan

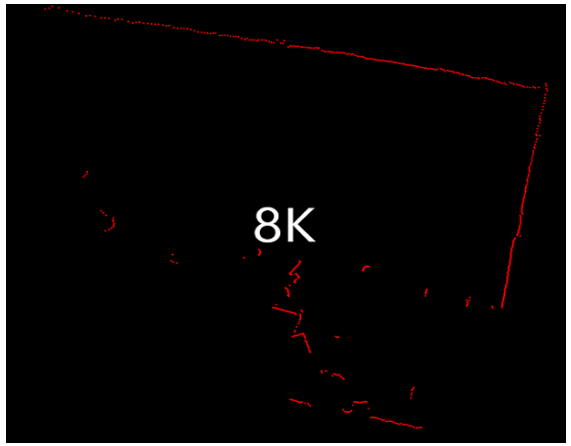
RPLiDAR A1

-12M, 2K/4K



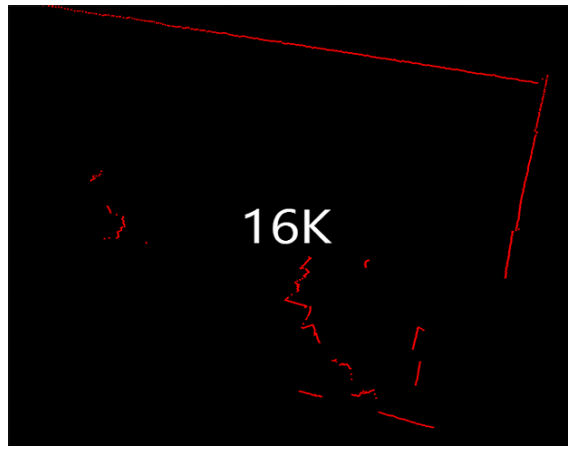
RPLIDAR A2

-16M, 4K/8K



RPLiDAR A3

-25M, 16K



ROS

샘플이 많을 수록 맵핑 속도가 빠르고 정밀.

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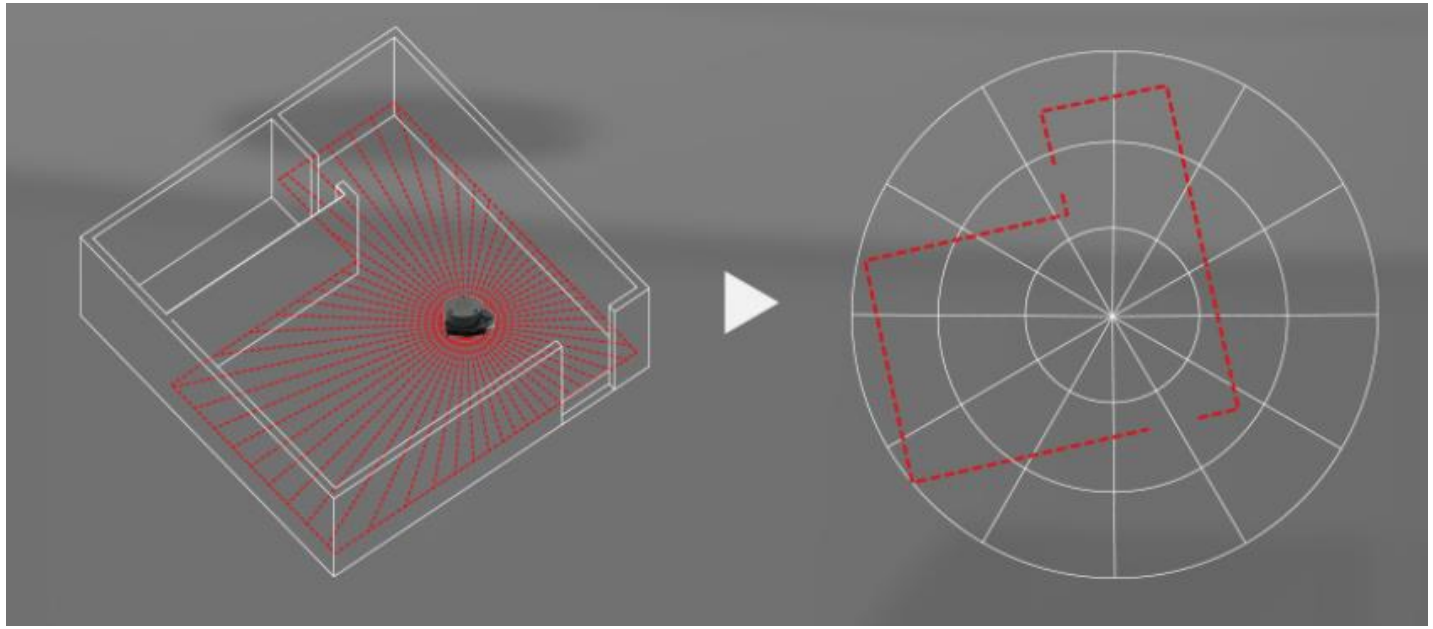
02

LiDAR using ROS

RPLiDAR Laser Scan

2D Laser Scan 드라이버 장치 (sensor_msgs / LaserScan) data publish



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RPLiDAR Laser Scan

PublisherNode

- Topic : sensor_msgs / LaserScan

Service

- stop & start motor : std_srvs / Empty

Parameters

- serial port : string, default : dev/ttyUSB0
- serial_baudrate (115200)

Scan_mode (String, default :std::string())

-lidar scan mode

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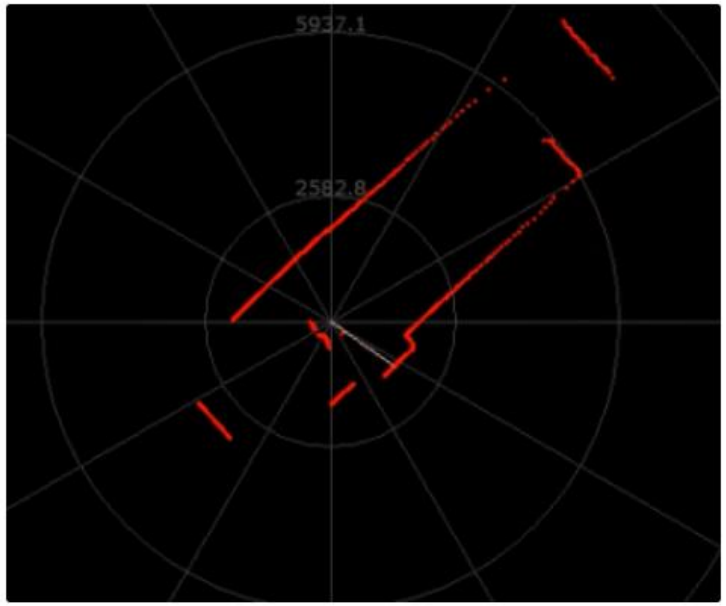
RPLiDAR Laser Scan

rplidarNode 드라이버 제공

-RPLiDAR 원시 스캔 결과를 이용하여 ROS LaserScan 메시지 변환



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RPLiDAR Laser Scan

RPLiDAR ROS Package

- https://github.com/Slamtec/rplidar_ros.git
- Ls –l /dev |grep ttyUSB

  [포트 권한 확인]
- sudo chmod 666 /dev/ttyUSB0

  [사용 권한 설정]

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RPLiDAR Laser Scan

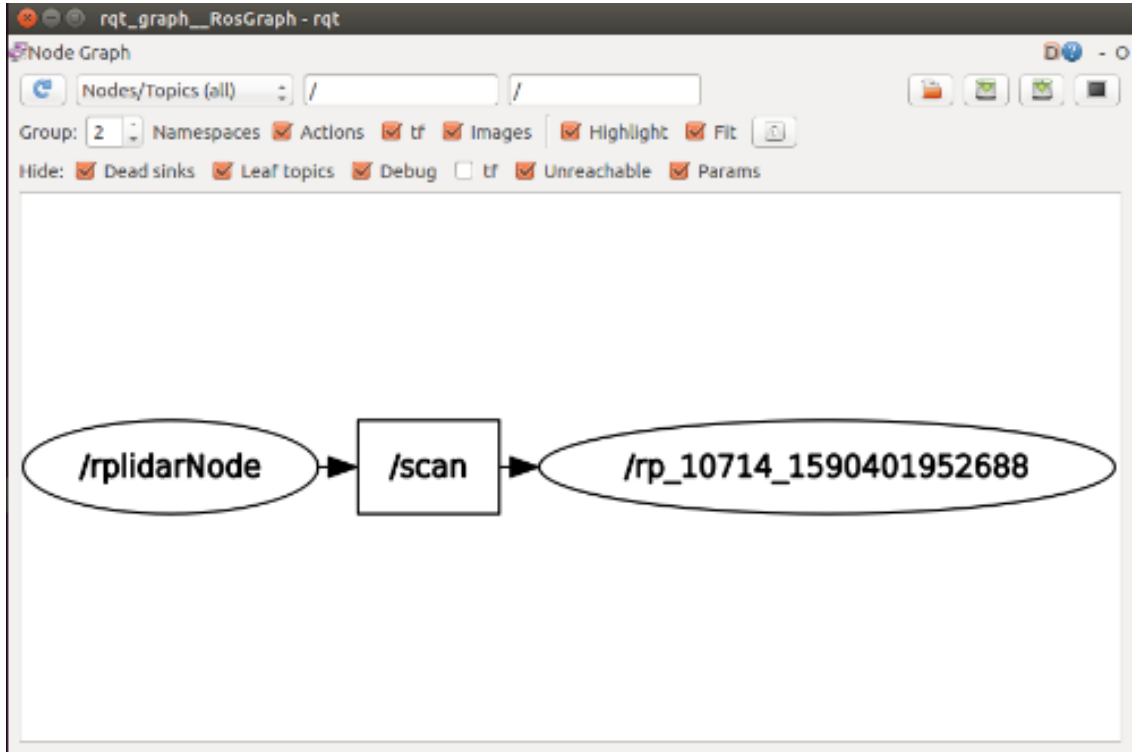
RPLiDAR ROS Package_Node start

- roslaunch rplidar_ros view_rplidar.launch
- roslaunch rplidar_ros view_rplidar.launch
- rosrun rplidar_ros rplidarNodeClient

[스캔 결과]

RPLiDAR Laser Scan

- rqt_graph



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RPLiDAR Laser Scan

sensor_msgs/LaserScan Message

File: sensor_msgs/LaserScan.msg

Raw Message Definition

```
# Single scan from a planar laser range-finder
#
# If you have another ranging device with different behavior (e.g. a sonar
# array), please find or create a different message, since applications
# will make fairly laser-specific assumptions about this data

Header header            # timestamp in the header is the acquisition time of
                         # the first ray in the scan.
                         #
                         # in frame frame_id, angles are measured around
                         # the positive Z axis (counterclockwise, if Z is up)
                         # with zero angle being forward along the x axis

float32 angle_min        # start angle of the scan [rad]
float32 angle_max        # end angle of the scan [rad]
float32 angle_increment  # angular distance between measurements [rad]

float32 time_increment   # time between measurements [seconds] - if your scanner
                         # is moving, this will be used in interpolating position
                         # of 3d points
float32 scan_time        # time between scans [seconds]

float32 range_min        # minimum range value [m]
float32 range_max        # maximum range value [m]

float32[] ranges         # range data [m] (Note: values < range_min or > range_max should be discarded)
float32[] intensities    # intensity data [device-specific units].  If your
                         # device does not provide intensities, please leave
                         # the array empty.
```

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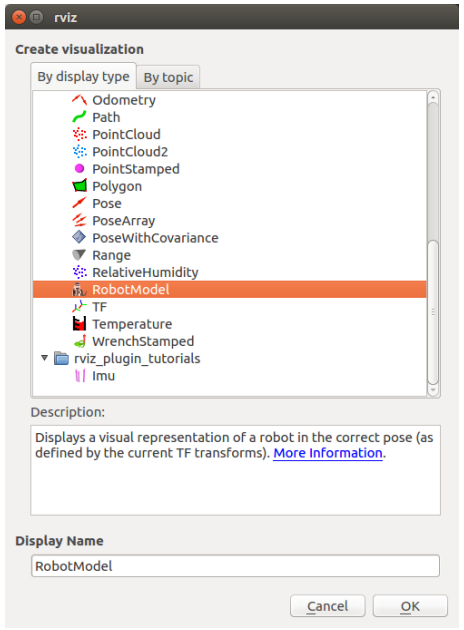
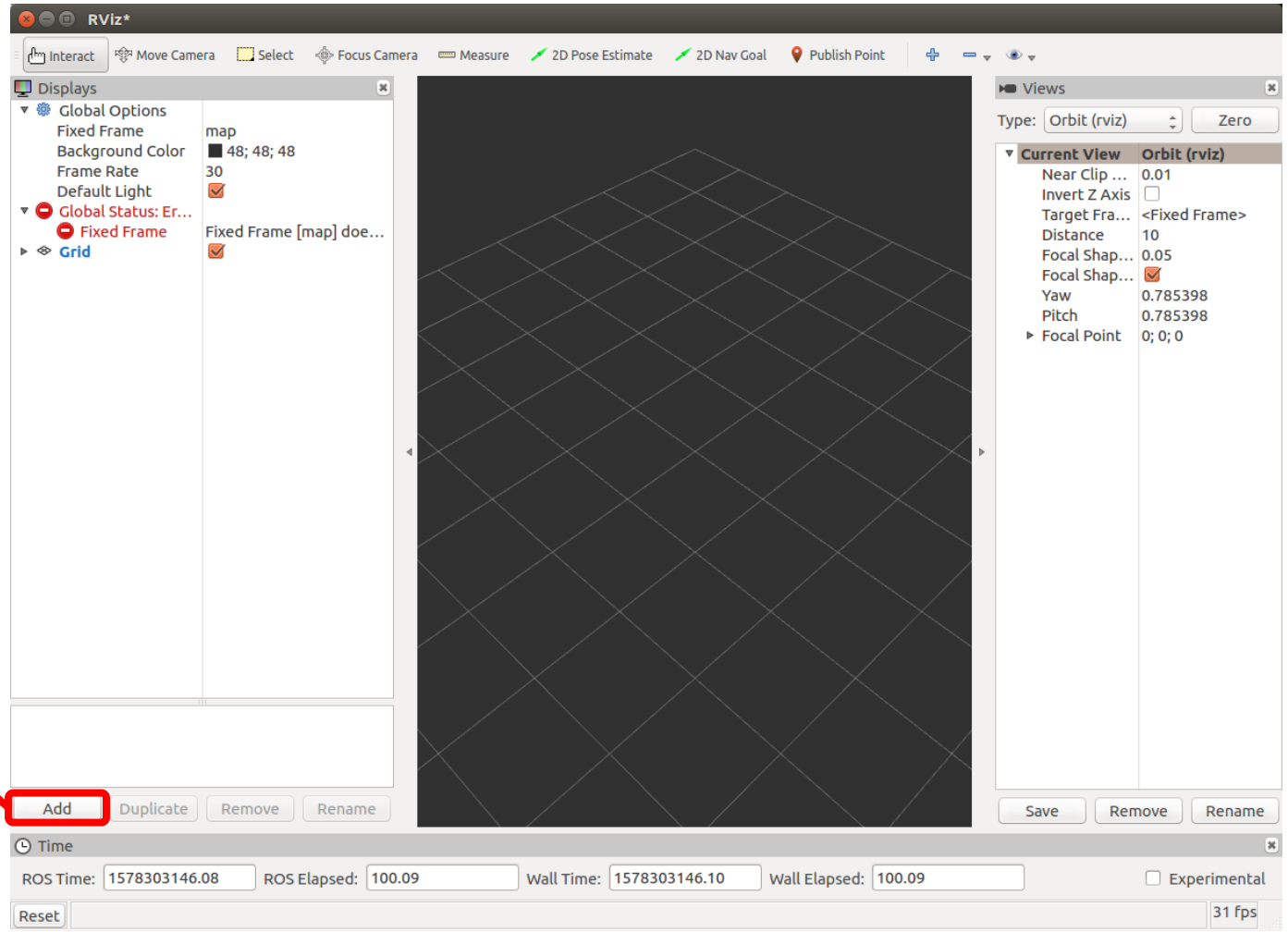
$RViz


rviz
Create visualization
By display type
By topic
Odometry
Path
PointCloud
PointCloud2
PointStamped
Polygon
Pose
PoseArray
PoseWithCovariance
Range
RelativeHumidity
RobotModel
TF
Temperature
WrenchStamped
rviz_plugin_tutorials
Imu
Description:
Displays a visual representation of a robot in the correct pose (as defined by the current TF transforms). More Information.
Display Name
RobotModel
Cancel
OK


RViz*
Interact
Move Camera
Select
Focus Camera
Measure
2D Pose Estimate
2D Nav Goal
Publish Point
Displays
Global Options
Fixed Frame
map
Background Color
48; 48; 48
Frame Rate
30
Default Light
Global Status: Er...
Fixed Frame
Fixed Frame [map] doe...
Grid
Add
Duplicate
Remove
Rename
Views
Type:
Orbit (rviz)
Zero
Current View
Orbit (rviz)
Near Clip ...
0.01
Invert Z Axis
Target Fra...
<Fixed Frame>
Distance
10
Focal Shap...
0.05
Focal Shap...
Yaw
0.785398
Pitch
0.785398
Focal Point
0; 0; 0
Save
Remove
Rename
Time
ROS Time:
1578303146.08
ROS Elapsed:
100.09
Wall Time:
1578303146.10
Wall Elapsed:
100.09
Experimental
Reset
31 fps